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COMMUNICATION IV

Curcumin for Upgrading Skin Colour of Broilers

ABSTRAK

Kurkumin telah dicampur dalam makanan ayam pada kadar 1 mg, 10 mg dan 100 mg per kilogram makanan dan diberi makan selama tiga minggu kepada sekumpulan 37 ekor anak ayam pedaging Isa-Vedette yang berumur dua minggu untuk memperbaiki pigmen kulit. Campuran kurkumin telah menghasilkan perkembangan warna oren kekuningan yang menarik pada kulit ayam pedaging itu, dibandingkan dengan kulit ayam pedaging kawalan. Keamatan warna kulit kelihatan paling tinggi pada ayam yang menerima 100 mg pewarna itu. Perkembangan hati berlemak kelihatan berhubungkait dengan kuantiti kurkumin yang telah diberi kepada ayam.

ABSTRACT

Curcumin was mixed in chicken feed at the rate of 1 mg, 10 mg and 100 mg per kilogram of feed and fed to a group of 37 two-week-old Isa-Vedette broiler chicks for three weeks to improve the pigmentation of the skin. The treatment resulted in the development of an attractive yellowish orange coloration of the skin compared to the skin of control birds. Skin colour intensity was noted highest in birds that received 10 mg of curcumin per kilogram of feed and second highest in birds that received 100 mg of the colourant. The development of fatty liver is seen to correlate with the quantity of curcumin given to the birds.

INTRODUCTION

A consumer will prefer buying a broiler with a bright healthy looking skin rather than one with a pale looking skin. Farmers have been known to use colourants, such as xanthophylls (Nutribasics Company, USA) from plants to improve skin pigmentation in broilers.

Plant pigments, by virtue of their natural occurrence in edible plants, are considered to be harmless. Curcumin, (1,7-bis (4-hydroxy-3-methoxyphenyl)-1, 6-heptadiene-3, 5-dione) (*Fig. 1*), the fluorescent yellow coloured extract from the rhizome of the plant *Curcuma longa* L. (Zingiberaceae), is approved for use as a colourant in food processing (WHO 1975) and labelled as E 100. It is used as a spice and colouring agent in curries in India and Southeast Asia (Perotti 1975). A synthetic manufacturing route of curcumin is available but is more costly than natural extraction (Walford 1978). Commercial quantities are therefore available only from natural sources with a general purity of 97% effective agent.

In this study, the use of crystalline curcumin as an alternative colourant for the improvement of the pigmentation of broiler skin was investigated.

MATERIALS AND METHODS

Crystalline curcumin (BDH chemicals) was thoroughly mixed with broiler grower crumble feed (Gold Coin 203C, Malaysia) at three levels of inclusion, 1 mg, 10 mg and 100 mg of curcumin per kilogram of feed to determine which level would give the best skin pigmentation. The untreated feed acted as control. Each treated feed mixture was given to a group of 37 two-week-old Isa-Vedette broiler chicks and the control feed to 39 chicks (Universiti Pertanian Malaysia Hatchery) for three weeks. Feed and water was provided *ad libitum*. At the end of the curcumin treatment, all the birds were sacrificed and defeathered. The intensity of skin coloration was evaluated visually. Visual observations on the unexpected damage in the liver were also recorded (Table 1).

RESULTS AND DISCUSSION

All levels of curcumin treatment resulted in the development of an attractive yellowish orange coloration on the broiler skin, compared to the skin of control birds (Table 1). Skin colour intensity was highest in birds that received 10 mg of curcumin per kilogram of feed and the second

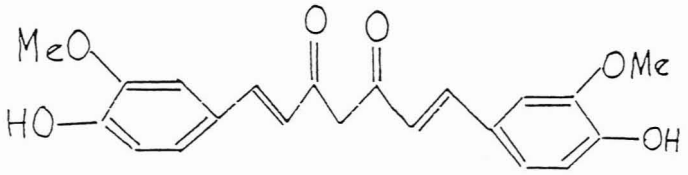

Fig. 1. Structural formula of curcumin, (1,7-bis (4-hydroxy-3-methoxyphenyl)-1, 6-heptadiene-3, 5-dione)

highest in birds receiving 100 mg of the colourant. The 1-mg-treatment was probably too low for optimal colour development of the skin while the 100-mg-treatment was probably too excessive or toxic for the liver (Table 1), resulting in some curcumin being trapped in the liver and not transported to the skin.

TABLE 1
Intensity of broiler skin coloration and degree of liver damage

Treatment (mg curcumin/kg feed)	Colour Intensity	Fatty liver
1	+	+
10	+++	++
100	++	+++
0 (Control)	0	0

0 : Nil
\+ : Mild
++ : Medium
+++ : High

Our results thus show that it is possible to improve the skin colour of broilers with the addition of curcumin in feed. The attractive colour of the skin is an important factor for promoting the sale of slaughtered broilers. Consumers will easily accept curcumin as the pigmenting material since it is an accepted natural colour source for food processing. Furthermore, the curcuma plant grows easily in the tropics; thus it is cheaply available in bulk quantities for broiler producers. To our know-ledge, the use of curcumin as a pigmenting material has not been reported although the use of xanthophylls (Nutribasics Company, U.S.A.) is a known process.

DISCUSSION

Future studies will investigate the optimum level of inclusion of curcumin for improving skin pigmentation and the relationship between the hepatic lesion and the metabolism of the colourant.

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